

Lesson 4-3

Prime Numbers and Prime Factorization

Lesson Objective

To factor numbers and to find the prime factorization of numbers

NAEP 2005 Strand: Number Properties and Operations

Topic: Properties of Number and Operations

Local Standards: _____

Vocabulary

A factor is _____

A composite number is _____

A prime number is _____

A prime factorization is _____

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Example 1- Finding Factors using Factor Rainbows

a) List the factors of 25

b) A gift box must hold the same number of pears in each row. You have 24 pears. What arrangements can you use?

Solutions: _____, _____, _____ or _____

Example 2- Prime or Composite?

- a. Is 61 prime or composite? Explain.

61 is _____ because _____
_____.

- b. Is 65 prime or composite? Explain.

65 is _____ because _____
_____.

Example 3- Prime Factorization-

Famous mathematician, Euclid, wrote in his book *Elements* (written 300 BC), the *Fundamental Theorem of Arithmetic* which states that _____
_____.

- a. Write the *prime factorization* of 90 using exponents.

Factor Tree Method

90

Birthday Cake Method

90

Sieve of Eratosthenes

Name: _____ Date: _____

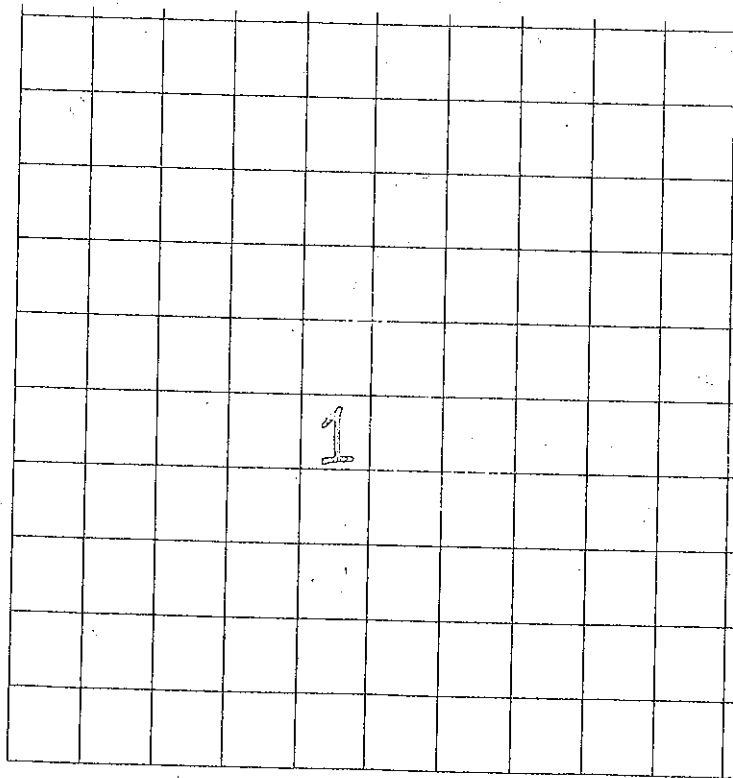
To find all of the prime numbers, start by crossing out all that are multiples of 2.
Do the same for 3, 5, and so on, until the only numbers left are primes.

	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Ulam Spiral

An Ulam spiral is a pattern of numbers. It was discovered in 1963 by Stanislaw Ulam who, amongst other things, was a mathematician. With a flair for finding simplicity in complexity he developed many mathematical tools and was a key contributor to designs that made nuclear fusion bombs possible.

Ulam, bored whilst in a scientific meeting, decided to draw the positive integers (whole numbers) in a grid. Starting with 1 in the middle and spiraling out from the center. Not the sort of thing most people would do, but it was right up Ulam's alley... especially when he was bored. Ulam went one step further with his boredom and decided to **circle all the prime numbers** in his drawing.



Ulam was surprised to find that _____

Lesson 4-3 Homework Part 1

1. Make a list of all the prime numbers from 50 through 75. _____

Tell whether each number is prime or composite. First, make a factor rainbow for each.

2. 53

3. 86

4. 95

5. 17

6. 24

7. 27

8. 31

9. 51

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

Lesson 4-3 Homework Part 2

Find the prime factorization of each number. For # 17-19 make a Factor Tree.

For # 20-22 make a Birthday Cake.

17. 58

19. 40

21. 144

18. 72

20. 30

22. 310

17

18

19

20

21

22